

Systematic Study of the Genus *Epinotia* Hübner (Lepidoptera, Tortricidae) from Korea*

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Abstract Sixteen species of the genus *Epinotia* Hübner, [1825] are recognized from Korea. Among them, a species, *E. parki* is described as new to science, and five species <*E. cruciana* (Linnaeus), *E. pinicola* Kuznetsov, *E. thapsiana* Zeller, *E. majorana* (Caradja) and *E. ulmicola* Kuznetsov> are reported for the first time from Korea. Adults and genitalia of both sexes are illustrated. Host plants are listed. A key to all known species of the genus based on the external character and male genitalia are provided.

Key words Systematics, Lepidoptera, Tortricidae, Olethreutinae, *Epinotia*, new species, Korea

INTRODUCTION

Genus *Epinotia* Hübner is one of the largest group of the family Tortricidae and is distributed in worldwide, mainly in the Holarctic Region, with more than 100 Palearctic species (Razowski, 1989). Larvae of many species feed on needle- to broad-leaved trees, and a part of them are known as important forestry pests. Park (1983) first reviewed the genus from Korea, with four species and later six species were added to the Korean fauna by Park and Ahn (1988), Byun and Park (1992, 1993), and Jaros *et al.* (1992), i.e., *contrariana* (Christoph), *exquisitana* (Christoph), *pentagonana* (Kennel), *piceae* (Issiki), *rubricana* Kuznetsov, and *ulmi* Kuznetsov. From the result of this study, further six species including a new species are recognized, i.e., *E. cruciana* (Hübner), *E. pinicola* Kuznetsov, *E. parki* Bae, sp. nov., *E. thapsiana* Zeller, *E. majorana* (Caradja) and *E. ulmicola* Kuznetsov, as members of the genus in Korea. Abbreviations for collections and provincial names are as follows: ASTI- Agricultural Science and Technology Institute, Suwon; CIS- Center for Insect Systematics, Kangwon Natural University, Chuncheon; FRI- Forest Research Institute, Seoul; UIB- Department of Biology, University of Incheon, Incheon; GG- Gyeonggi; GW- Gangwon; CN- Chungnam; CB- Chungbuk; JN- Jeonnam; JB- Jeonbuk; GN- Gyeongnam; GB- Gyeongbuk; CJ- Cheju; NK- North Korea.

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Genus *Epinotia* Hübner, [1825]

- Epinotia* Hübner, [1825], Verz. bekannter Schmett.: 377. Type species: *Phalaena similana* Hübner, 1793.
- Astatia* Hübner, [1825], *ibid.*: 377. Type species: [*Tortrix*] *parmatana* Hübner, [1817] = *Phalaena Tortrix solandriana* Linnaeus, 1758.
- Evetria* Hübner, [1825], *ibid.*: 378. Type species: [*Phalaena*] *tedella* Clerck, 1759.
- Asthenia* Hübner, [1825], *ibid.*: 381. Type species: [*Tortrix*] *pygmaeana* Hübner, [1796-1799].
- Acalla* Hübner, [1825], *ibid.*: 385. Type species: [*Tortrix*] *ophthalmicana* Hübner, [1796-1799] = *Pyrallis maculana* Fabricius, 1775.
- Panoplia* Hübner, [1825], *ibid.*: 393. Type species: [*Tortrix*] *angustana* Hübner, [1813] = *Phalaena Tortrix cruciana* Linnaeus, 1758.
- Coccyx* Treitschke, 1829, Schmett. Eur., **7**: 230. Type species: *Tortrix comitana* [Denis & Schiffermüller] 1775 = [*Phalaena*] *tedella* Clerck, 1759.
- Steganoptycha* Stephens, 1829, Syst. Cat. Br. Insects, **2**: 176. Type species: *Pyrallis boeberana* Fabricius, 1787 = [*Phalaena*] *nisella* Clerck, 1759.
- Poecilochroma* Stephens, 1829, *ibid.*: 183. Type species: *Phalaena Tortrix solandriana* Linnaeus, 1758.
- Paedisca* Treitschke, 1830, Schmett. Eur., **8**: 188. Type species: [*Tortrix*] *parmatana* Hübner, [1817] = *Phalaena Tortrix solandriana* Linnaeus, 1758.
- Paragrapha* Sodoffsky, 1837, Bull. Soc. Naturalistes Moscou, **6**: 92, 97. Type species: [*Tortrix*] *parmatana* Hübner, [1817] = *Phalaena Tortrix solandriana* Linnaeus, 1758.
- Phlaeodes* Guenée, 1845, Annls Soc. ent. Fr., (2) **3**: 172. Type species: [*Tortrix*] *frutetana* Hübner, [1796-99] = *Tortrix tetraquetra* Haworth, [1811].
- Hypermercia* Guenée, 1845, *ibid.*: 173. Type species: [*Tortrix*] *angustana* Hübner, [1813] = *Phalaena Tortrix cruciana* Linnaeus, 1758.
- Cartella* Guenée, 1845, *ibid.*: 174. Type species: *Tortrix cretaceana* Frölich, 1828 = *Tortrix bilunana* Haworth, [1811].
- Pamplusia* Guenée, 1845, *ibid.*: 180. Type species: *Coccyx monticolana* Duponchel, 1843 = *Tortrix mercuriana* Frölich, 1828.
- Lithographia* Stephens, 1852, List Specimens Br. Animals Colln Br. Mus., **10**: 32. Type species: [*Phalaena*] *nisella* Clerck, 1759.
- Halonota* Stephens, 1852, *ibid.*: 45. Type species: *Phalaena Tortrix bimaculana* Donovan, 1808 = *Pyrallis stroemiana* Fabricius, 1781.
- Catastega* Clemens, 1861, Proc. ent. Soc. Philad., **1**: 86. Type species: *Catastega timidella* Clemens, 1861.
- Proteopteryx* Walsingham, 1879, Ill. Lepid. Heterocera Br. Mus., **4**: 68. Type species: *Proteopteryx umatginana* Walsingham, 1879.
- Neurasthenia* Pierce & Metcalfe, 1922, Genitalia Br. Tortricidae: 65. Replacement name for *Asthenia* Hübner, [1825]. Type species: [*Tortrix*] *pygmaeana* Hübner, [1796-1799].
- Griselda* Heinrich, 1923, Bull. U.S. nat. Mus., **123**: 186. Type species: *Paedisca radicana* Walsingham,

1879 = *Griselda radicana* Heinrich, 1923.

Hamuligera Obraztsov, 1946, Z. Wien. ent. Ges., **30** (1945): 31. Type species: *Phalaena Tortrix trimaculana* Donovan, 1806 = *Pyalis abbreviana* Fabricius, 1794.

Adult (Figs 1-21). Small in size; wing expanse 11~22mm. Head normal tortricid type; face smooth. Antenna filiform, about 0.5 times as long as costa of forewing. Labial palpus ascending; second segment densely clothed with long scales beneath. Forewing: Elongate triangular; costa often with costal fold in male; ground color creamy white to brownish gray, suffused with dark scales; markings reduced to some elements of typical pattern of tribe Eucosmini: terminal patch very weak. All veins separated; chorda and M (median stem) well preserved; chorda originating from upper margin of cell, between R_1 and R_2 ; R_1 from before middle of upper margin of cell; R_2 slightly nearer R_3 than R_1 ; R_4 and R_5 not united; M_2 and M_3 not connate. Hindwing: Common characters for the tortricidae; R_s and M_1 approximate; M_2 and M_3 approximate; M_3 and CuA_1 stalked.

Male genitalia (Figs 22-37). Tegumen broad. Uncus broad or slender. Socius usually subtriangular, sometimes elongate, often densely haired throughout, in some species well-sclerotized. Gnathos weakly sclerotized. Henion, a pair of band-like sclerotization from middle of gnathos to dorsal part of anellus, often present. Valva with usually inconspicuous neck; sacculus densely spined, without rudimentary clasper, outer surface lacking spin-like setae; cucullus oval or oblong, with stout spins along ventral margin; basal cavity rather small. Aedeagus simple, tubular; cornuti with a sheaf of long scale-like spines.

Female genitalia (Figs 38-48). Ovipositor short. Apophyses medium size, long in *E. bicolor* (Walsingham). Sterigma well-developed variably. Antrum sometimes developed. Ductus bursae sclerotized near middle (so called cingulum of Razowski, 1987b); ductus seminalis originating from anterior end of sclerotized part. Corpus bursae globular; two horn- or blade-shaped signa situated laterally.

Biology. Univoltine. Larvae feed on spun leaves and buds of trees, usually oligophagous. Hibernation takes place in the larval stage; pupae often in silken cocoons in the soil. Swatschek (1958) provided a diagnosis based on chaetotaxy of 29 species in Europe.

Distribution. Holarctic, Oriental, Australian and Neotropical regions. About 100 species occur in the Palaearctic Region.

Remarks. The supposed autapomorphy of the genus may be the structure of henion in the male genitalia as Razowski (1989) pointed out. This character is unique within the tribe Eucosmini, but several species of the genus do not have this character. The genus has been divided into several subgenera (e.g., *Epinotia* s. str., *Hamuligera*, *Steganoptycha*, *Panoplia*, *Proteopteryx*, and *Asthenia*) based on the structure of male genitalia and the presence of costal fold (Swatschek, 1958; Hannemann, 1961; Bradley et al., 1979). However, Razowski (1989) did not accept these opinion, stating that the differences of the genitalic structure among species are slight, and costal fold on the forewing are often founded throughout several genera. Author also agrees with his opinion.

Key to the Korean species of *Epinotia* Hübner based on the external character

1. Forewing with large, well-defined whitish or ochreous patch near middle of dorsum 2

- Forewing without such patch	4
2. Forewing with whitish patch at basal 2/3 of costa	<i>contrariana</i>
- Forewing without such patch	3
3. Forewing with broad and square dorsal patch	<i>pentagonana</i>
- Forewing with narrow and subsquare dorsal patch	<i>piceae</i>
4. Head white	<i>exquisitana</i>
- Head pale ochreous to dark brownish gray	5
5. Forewing with large subsquare yellowish orange central fascia	<i>bicolor</i>
- Forewing without such central fascia	6
6. Forewing ground color creamy white	7
- Forewing ground color pale ochreous to brownish gray	9
7. Forewing without distinct markings; outer edge suffused with fuscous scales	<i>pinicola</i>
- Forewing with distinct markings	8
8. Head with fuscous vertex. Forewing with blackish markings	<i>majorana</i>
- Head with creamy white vertex. Forewing with grayish brown markings	<i>thapsiana</i>
9. Thorax deep reddish orange	10
- Thorax pale gray to grayish fuscous scales	11
10. Antenna pale brown. Forewing ground color whitish ocher	<i>parki</i> sp. nov.
- Antenna dark brown. Forewing ground color yellowish ocher	<i>ustulana</i>
11. Forewing with ocelloid patch	12
- Forewing without ocelloid patch	<i>cruciana</i>
12. Forewing with costal fold	13
- Forewing without costal fold	14
13. Head and thorax ochreous	<i>rubricana</i>
- Head and thorax brownish gray	<i>rasdolnyana</i>
14. Forewing scattered with blackish and white grayish scales along dorsal margin	<i>ulmi</i>
- Forewing without such scales	15
15. Forewing with grayish brown or dark reddish brown markings	<i>rubiginosana</i>
- Forewing with pale yellowish brown markings	<i>ulmicola</i>

Key to the Korean species of *Epinotia* Hübner based on the male genitalic character

1. Henion present	2
- Henion absent	4
2. Uncus narrow at base, with emarginated round apex	<i>rubiginosana koraiensis</i>
- Uncus broad at base, with bifurcated and pointed apex	3
3. Uncus shortly emarginated at top	<i>pinicola</i>
- Uncus deeply bifurcated from its middle	<i>piceae</i>
4. Uncus long and narrow	5
- Uncus broad and short	7

- 5. Valva narrow, without well-defined angle *ulmicola*
- Valva broad clavate, without such angle 6
- 6. Aedeagus shorter than the diameter *majorana*
- Aedeagus longer than the diameter *thapsiana*
- 7. Valva deeply constricted with narrow neck 8
- Valva not constricted 9
- 8. Valva with well-defined angle at lower margin; cucullus long *ustulana*
- Valva without such angle; cucullus short *parki* sp. nov.
- 9. Cucullus terminally broad 10
- Cucullus terminally narrow or same wide 11
- 10. Aedeagus with a projection at 2/3 of ventral wall *bicolor*
- Aedeagus without such projection *rubricana*
- 11. Valva with distinct angle at lower margin *pentagonana*
- Valva without such angle 12
- 12. Valva with narrow neck, 0.5 times as wide as cucullus *contrariana*
- Valva without such neck 13
- 13. Uncus long, narrow at base, with emarginated round apex *exquisitana*
- Uncus without such shape 14
- 14. Socius long nipple-like *rasdolnyana*
- Socius triangular, broad basally, narrower terminally 15
- 15. Uncus large, deeply bifurcated from its base *ulmi*
- Uncus small, shortly bifurcated *cruciana*

***Epinotia ulmi* Kuznetsov, 1966** 끝희색애기잎말이나방

(Figs 1, 22)

Epinotia ulmi Kuznetsov, 1966, Trudy zool. Inst. Leningr., **7**: 182, figs 5, 6. Type locality: Russia (Far East: Primorye); Kawabe, 1982, **1**: 124, **2**: 175, pl. 26, fig. 38; Byun & Park, 1992, **8**: 202, figs 3, 12.

Adult (Fig. 1). Wing expanse, ♂ 14 mm, ♀ 15 mm. Sexual dimorphism not pronounced; forewing of female sprinkled with reddish brown. Head pale ocherous, mixed with gray. Antenna brownish gray. Labial palpus pale ocherous; outside of basal segment irrorated with gray. Thorax pale gray, mixed with blackish scales; tegula pale ocherous or reddish gray. Forewing narrow, without costal fold; ground color pale ocherous, scattered with dark grayish and pale brownish scales; markings ill-distinct; costa with seven pairs of whitish streaks from apex to base; basal patch and central fascia scattered with blackish scales of dorsal margin; terminal patch slender, oblique, overlaid with reddish brown; apical spot small, distinct; ocelloid patch well-developed, creamy white, with pale grayish laterally, and containing three or four black dashes medially; cilia creamy white, suffused with fuscous, and with a fuscous subbasal line.

Hindwing grayish brown, darker apically; cilia creamy white, with a grayish brown subbasal line

Male genitalia (Fig. 22). Uncus deeply bifurcated from its base, sharpened apically. Socius triangular, broad basally, rather narrower terminally, slightly hairy. Valva long and narrow, slightly curved near middle; cucullus bearing stout spines along the ventral margin from base to 4/5; sacculus with a spines cluster its before middle. Aedeagus short, simple, narrower terminally.

Material examined. [GW]- 1 ♂, Mt. Jeombong, 11. VII. 1997 (Paek, Lee, Jang, Choi & Kim), UIB; 1 ♂, Chuncheon, 2. VII. 1989 (K.T. Park & B.K. Byun), CIS-gen. sl. no. 2890; 1 ♀, Mt. Kyebang, 14. VI. 1996 (Y.S. Bae, M.K. Paek & B.W. Lee), ex. *Ulmus davidiana* Planchon var. *Japonica* (Rehd.) Nakai, UIB.

Distribution. Korea (GW), Japan, and Russia (Ussuri).

Host plants. Korea: *Ulmus davidiana* Planchon var. *Japonica* (Rehd.) Nakai (Ulmaceae). Japan: *Ulmus davidiana* Planchon var. *Japonica* (Rehd.) Nakai, and *Ulmus laciniata* (Trautv.) Mayr. (Ulmaceae), (Kawabe, 1982).

Remarks. This rare species is ranging from Russia to Japan. The species can be easily separated from the other related species by the forewing scattered with blackish and white grayish scales along dorsal margin.

***Epinotia rasdolnyana* (Christoph, 1882) 사각무늬애기잎말이나방**
(Figs 2-3, 23, 38)

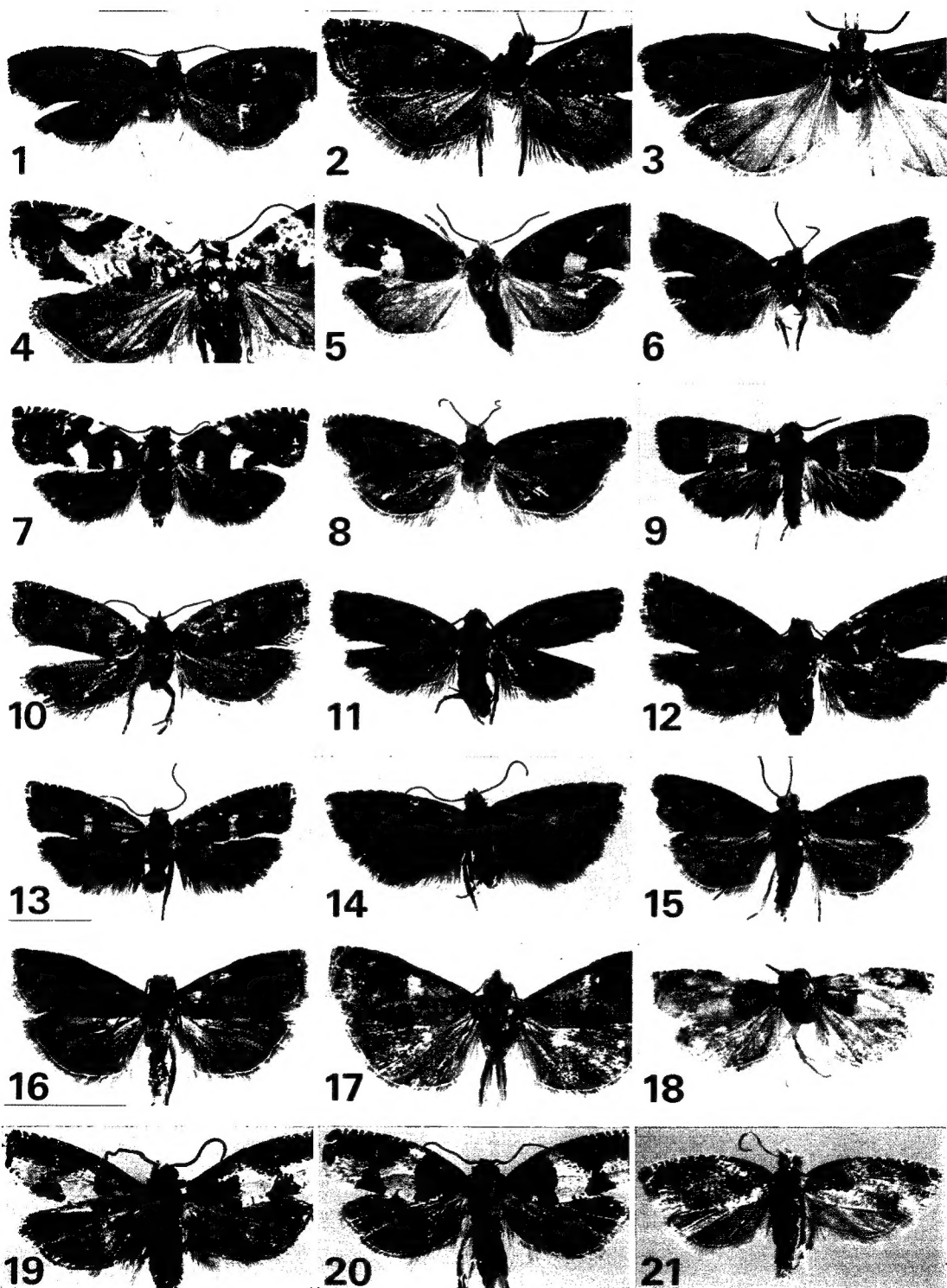
Steganoptycha rasdolnyana Christoph, 1882, Bull. Soc. Imp. nat. Moscou, **56**(2): 427. Type locality: Russia (Vladivostok).

Semasia rasdolnyana: Kennel, 1916, **21**: 498.

Epinotia rasdolnyana: Issiki, 1957, **1**: 59, pl. 9, figs 271-272; Kawabe, 1982, **1**: 124, **2**: 175, pl. 26, figs 43, 44; Park, 1983, **3**: 36.

Adult (Figs 2-3). Wing expanse, ♂ 16.5~21.5 mm. Sexual dimorphism not pronounced, but maculation and markings of forewing variably developed. Head brownish gray, suffused with white tip scales. Antenna pale grayish brown. Labial palpus brownish gray or whitish gray, outside of median segment irrorated with dark brown. Thorax irrorated with brownish gray. Abdomen pale grayish brown. Forewing narrow, with a costal fold from base to 1/3 of costa; ground color brownish gray, suffused with white tip scales; markings dark brown to pale brown; costa with seven pairs of whitish streaks from apex to base of wing; basal patch distinct, strongly angulated outwards or ill-distinct; central fascia oblique,

Figs 1-21. *Epinotia* spp., adults: 1. *E. ulmi* Kuznetsov, ♂; 2. *E. rasdolnyana* (Christoph), ♂; 3. *Ditto*, ♂; 4. *E. exquisitana* (Christoph), ♂; 5. *E. pentagonana* (Kennel), ♀; 6. *E. cruciana* (Hübner), ♂; 7. *E. contrariana* (Christoph), ♀; 8. *E. rubricana* Kuznetsov, ♀; 9. *E. bicolor* (Walsingham), ♂; 10. *E. pinicola* Kuznetsov, ♀; 11. *E. rubiginosana koraiensis* Falkovitsh, ♂; 12. *Ditto*, ♀; 13. *E. piceae* (Issiki), ♂; 14. *Ditto*, ♀; 15. *E. ustulana* (Hübner), ♂; 16. *E. ustulana* (Hübner), ♀; 17. *E. parki* sp. nov., ♂; 18. *E. thapsiana* Zeller, ♂; 19. *E. majorana* (Caradja), ♂; 20. *Ditto*, ♀; 21. *E. ulmicola* Kuznetsov, ♂.



sometimes forming blackish longitudinal streak above ocelloid patch; dorsal blotch subsquare, widely interrupted at dorsal 1/3 or urdiment; apical spot small; ocelloid patch developed, with silvery metallic streak laterally, and marked with three or four black dashes medially; cilia brownish gray with a dark brown subbasal line. Hindwing brownish gray; cilia concolorous with ground color, with a darker subbasal line.

Male genitalia (Fig. 23). Uncus broad, shortly bifurcated, with sharpened apex. Socius long nipple-like, moderate hairy. Valva short and broad, curved near middle, with narrow neck, concave at middle of ventral margin; cucullus bearing stout spines along ventral margin from base to 4/5; sacculus with a large spines cluster at costal margin. Aedeagus short, simple, narrower towards terminally.

Female genitalia (Fig. 38). Sterigma subquadrate. Ostium bursae with antrum cup-shaped. Ductus bursae with slightly sclerotized band beyond half; ductus seminalis originating before sclerotized band. Corpus bursae globular, spinulate except around signa: signa two, shoe-horn-like, different in size.

Material examined. [GW]- 1 ♀, Mt. Odae, 12. IX. 1976 (K.T. Park), CIS; 1 ♀, same locality, 15. IX. 1976 (J.S. So), CIS-gen. sl. no. 3586; 1 ♀, Hongcheon, 15. VI. 1989 (K.S. Lee), CIS; 1 ♂, Mt. Taebaek, 27. VI. 1996 (Bae, Paek, Lee & Ahn), UIB-gen. sl. no. 118. [GG]- 5 ♀, Gwangleung, 7. IX. 1986 (K.J. Won), CIS-gen. sl. no. 3584; 1 ♀, Gwangleung, 30. IX. 1986 (K.J. Won), CIS; 2 ♀, Gwangleung, 7-8. X. 1986 (K.J. Won), CIS; 1 ♀, Suwon, 18. X. 1982 (C.H. Ryu), CIS.

Distribution. Korea (GW, GG), Japan, and Russia (East Siberia).

Host plant. Korea: unknown. Russia: *Acer* spp. (Aceraceae), (Kawabe, 1982).

Remarks. Maculations and markings of this species are variably developed, but differentiated from other species by the large wing size (16.5~21.5mm) and the distinct basal patch or subsquare dorsal blotch of the forewing. Moths appear until the late season, the end of October in Korea.

***Epinothia exquisitana* (Christoph, 1881) 흰마당애기잎말이나방**
(Figs 4, 24, 39)

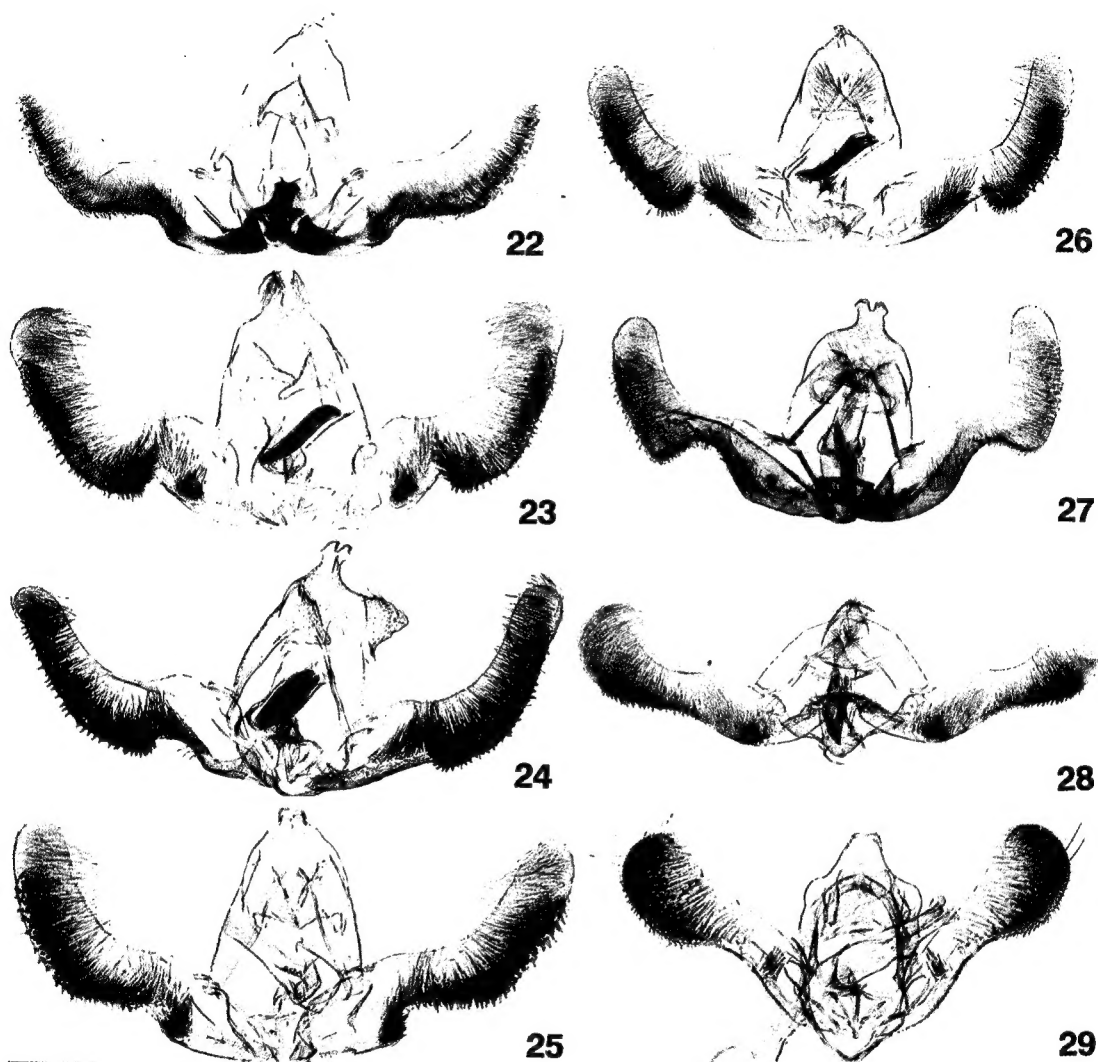
Steganoptycha exquisitana Christoph, 1881, Bull. Soc. imp. Nat. Moscou, **56**(2): 428. Type locality: Russia (Vladivostok).

Eucosma pica Walsingham, 1900, Ann. Mag. nat. Hist., (7) **6**: 337.

Epinothia exquisitana: Kawabe, 1982, **1**: 125, **2**: 175, pl. 26: 47; Byun & Park, 1993, **32**: 204-205, figs 6, 19.

Panoplia exquisitana: Issiki, 1957, **1**: 60, pl. 9, fig. 276.

Adult (Fig. 4). Wing expanse, ♂ 16~16.5mm, ♀ 18mm. No sexual difference in wing maculation. Head white; vertex mixed with blackish brown. Antenna dark brown; scape white. Labial palpus white, outside of median segment irrorated with dark brown. Thorax white, mixed with blackish brown. Abdomen pale brownish gray. Forewing narrow, with a narrow costal fold from base to 1/3 of costa; ground color white; markings blackish brown; costa with four pairs of whitish streaks from apical half; basal patch indicated by five or seven dots diverse size; central fascia distinct, oblique, widely interrupted



Figs 22-29. *Epinotia* spp., male genitalia: 22. *E. ulmi* Kuznetsov; 23. *E. rasdolnyana* (Christoph); 24. *E. exquisitana* (Christoph); 25. *E. pentagonana* (Kennel); 26. *E. cruciana* (Hübner); 27. *E. contrarianana* (Christoph); 28. *E. rubricana* Kuznetsov; 29. *E. bicolor* (Walsingham).

at dorsal 1/3; apical patch small, defined; a pale plumbeous streaks present beneath of apical spot; ocelloid patch large, distinct, with two pale plumbeous streaks; cilia white, apical half and tornus mixed with blackish brown, and with a blackish brown subbasal line on apical half and tornus. Hindwing pale brownish gray; cilia brownish gray, with a dark subbasal line.

Male genitalia (Fig. 24). Uncus large, narrow at base, with emarginated round apex. Socius triangular, broad basally, narrower terminally, moderate hairy. Valva long and narrow, curved near middle, with broad neck, concave at 1/3 of ventral margin; cucullus bearing stout spines along ventral margin from base to 4/5; saccus with a large spines cluster at near neck. Aedeagus short, simple, tapering towards

top; cornuti a sheaf of many scale-like spines.

Female genitalia (Fig. 39). Sterigma horseshoe-shaped. Ostium bursae cup-shaped. Ductus bursae with long sclerotized part medially, with a neck before antrum; ductus seminalis originating before sclerotized band. Corpus bursae globular, spinulate except around signa: signa two, long blade-like.

Material examined. [GW]- 1 ♀, Mt. Yaksu, 9. VIII. 1989 (K.T. Park), CIS-gen. sl. no. 2891; 1 ♀, Mt. Jeombong, 13. VII. 1997 (Paek, Lee, Jang, Choi & Kim), UIB. JAPAN- 1 ♂, Hikagedaira, Gifu Prefecture, 16-17. VII. 1987 (Y.S. Bae), UIB-gen. sl. no. 182; 1 ♀, Kisojihar, Nagano Prefecture, 22-23. VII. 1994 (Y.S. Bae), UIB.

Distribution. Korea (GW), Japan, and Russia (Amur).

Host plants. Korea: unknown. Japan: *Prunus maximowiczii* Rupr., *Sorbus commixta* Hedlund., and *S. alnifolia* (Sieb. et Zucc.) (Rosaceae), (Kawabe, 1982).

Remarks. An eastern Palaearctic species. The species is easily separated from other species by the whitish head and whitish ground color of the forewing.

***Epinotia pentagonana* (Kennel, 1901) 각무늬애기잎말이나방**

(Figs 5, 25, 40)

Epiblema pentagonana Kennel, 1901, Dt. ent. Z. Iris, **13**: 289. Type locality: Far East Asia (Hadjin).

Epinotia pentagonana: Kawabe, 1982, **1**: 125, **2**: 175, pl. 26: 49; Byun & Park, 1993, **32**: 203-204, figs 5, 12, 18.

Epinotia maculosa Kuznetsov, 1966, Trudy Zool. Inst. Lenigr., **37**: 177, figs 1-2.

Adult (Fig. 5). Wing expanse, 15~16mm. No sexual difference in wing maculation. Head ochreous; vertex tinged with gray. Antenna dark brown; scape ochreous. Labial palpus ochreous; outside of basal segment irrorated with pale grayish brown; terminal segment shortly exposed, mixed with brownish gray. Thorax grayish brown or ochreous, with posterior crest fuscous. Abdomen pale brownish gray, with anal tufts ochreous. Forewing broad, with a costal fold from base to 3/5 of costa; hair pencils from base to 4/5 of costal fold; ground color white, partly suffused with brown; markings dark fuscous gray; costa with eight pairs of white streaks from base to apex; basal patch and central fascia confluent; a large, white patch at near middle of dorsum, well defined; apical spot small; a pale plumbeous streaks beneath of apical spot; ocelloid patch large, distinct and white, with two pale plumbeous streaks; cilia pale fuscous gray, with a dark subbasal line. Hindwing light grayish brown, becoming darker apically; cilia pale gray, with a grayish brown subbasal line.

Male genitalia (Fig. 25). Uncus small, shortly bifurcated. Socius triangular, broad basally, narrower terminally, slightly hairy. Valva curved near middle, with broad neck, concave at 1/3 of ventral margin; cucullus bearing stout spines along ventral margin from base to 4/5; sacculus with a distinct spines cluster below neck. Aedeagus short, simple, tapering towards top; cornuti a sheaf of long scale-like spines.

Female genitalia (Fig. 40). Sterigma membranous. Ostium bursae U-shaped. Ductus bursae with long sclerotized part medially, with a neck before antrum; ductus seminalis originating in sclerotized part.

Corpus bursae globular, spinulate on inner surface except around signa: signa two, horn-like, with rounded apices.

Material examined. [GW]- 2 ♂, 1 ♀, Mt. Odae, 6. VIII. 1989 (K.T. Park), CIS-gen. sl. no. 2979, 2893; 1 ♂, 1 ♀, Mt. Kyebang, 2. VIII. 1989 (K.T. Park & B.K. Byun), CIS-gen. sl. no. 2894; 2 ♀, Mt. Kyebang, 24. VIII. 1989 (K.T. Park), CIS-gen. sl. no. 2981.

Distribution. Korea (GW), Japan, and Russia (Ussuri).

Host plant. Korea: unknown. Japan: *Celtis* sp. (Ulmaceae), (Kawabe, 1982).

Remarks. An eastern Palearctic species. The species is easily distinguished from other species by the large white patch at the dorsum of the forewing. Moths collected in August.

***Epinotia cruciana* (Linnaeus, 1761) 황떠애기잎말이나방 (신칭)**

(Figs 6, 26)

Phalaena cruciana Linnaeus, 1761, Fauna Svecica (Edn. 2): 347, no. 1333. Type locality: Europe.

Tortrix augustana Hübner, [1800], Schmet. Europ., fig. 205.

Enarmonia cockleana Kearfott, 1904, Can. Ent., **36**: 137; Dyar, 1904, Proc. U. S. Nat. Mus., **27**: 929.

Epinotia lepida Heinrich, 1924; Powell, 1983: 36.

Epinotia cruciana alaskae Heinrich, 1923, **123**: 229-230, fig. 336.

Steganoptycha cruciana: Staudinger & Rebel, 1902, Cat. Lepid., **2**: 2003.

Epinotia augustana: Fernald, 1903, In Dyar List No. Amer. Lepid.: no 5228.

Laspeyresia cockleana: Barnes & McDunnough, 1917, Check List Lepid. Bor. Amer.: no. 7243.

Epinotia cruciana: Heinrich, 1923, **123**: 228-229; Kuznetsov, 1978, **4**: 482, 490, figs 417-6, 423-1; Bradley et al., 1979: 121-122, pl. 30, figs 20-25.; Kawabe, 1982, **1**: 125, **2**: 175, pl. 26: 46; Powell, 1983: 36; Miller, 1987: 77; Razowski, 1987: 36-37, Figs 17, 166, pl. 2. fig. 6; Larsen & Vilhelmsen, 1988, **6**: 228, pl. 11, figs 33-36.

Adult (Fig. 6). Wing expanse, ♂ 13mm. Head grayish ochreous; face creamy white; vertex mixed with gray. Antenna dark gray, with whitish annulations. Labial palpus short, pale ochreous; median segment densely clothed with long scales beneath, irrorated with gray outwardly; terminal segment overlaid with blackish brown except on top. Thorax grayish fuscous, mixed with orange; tegula yellowish ochreous. Abdomen brownish gray, ochreous gray on underside. Forewing narrow, with a slender costal fold from base to middle of costa; costa with two pairs of white yellowish streaks on apical 3/4; ground color pale brownish gray, suffused with orange; markings dark brown; basal patch well defined, oblique, with slender and white strigula on outer edge; central fascia oblique, band like, with two metallic gray strigula on inner and outer edges; apical spot large, well defined; ocelloid patch not formed, and this area with metallic gray streak; cilia dark gray, tinged with ochreous at apical 1/3, and with dark brown subbasal line. Hindwing brownish gray; cilia pale gray, with a dark subbasal line.

Male genitalia (Fig. 26). Uncus shortly bifurcated, sharpened apically. Socius triangular, broad basally,

narrower terminally, densely hairly. Valva curved near middle, with narrow neck; cucullus bearing stout spines along ventral margin from base to 3/4; sacculus with a large spines cluster below neck. Aedeagus short, simple, tapering towards top; cornuti a sheaf of long scale-like spines.

Material examined. [GW]- 1 ♂, Mt. Kyebang, 21. VI. 1996 (Bae, Paek, Lee & Ahn), UIB-gen. sl. no. 119.

Distribution. Korea (GW), Japan, China, Russia, Europe, and N. America.

Host plant. Korea: unknown. Japan: *Salix* spp. (Salicaceae), (Kawabe, 1982).

Remarks. This species is recorded for the first time from Korea. A single male specimen was collected from Mt. kyebang, Gangwon Province.

***Epinotia contrariana* (Christoph, 1881) 흰세점애기잎말이나방**
(Figs 7, 27, 41)

Grapholitha contrariana Christoph, 1881, Bull. Soc. Imp. nat. Moscou, **56**(2): 424. Type locality: Russia (Vladivostok).

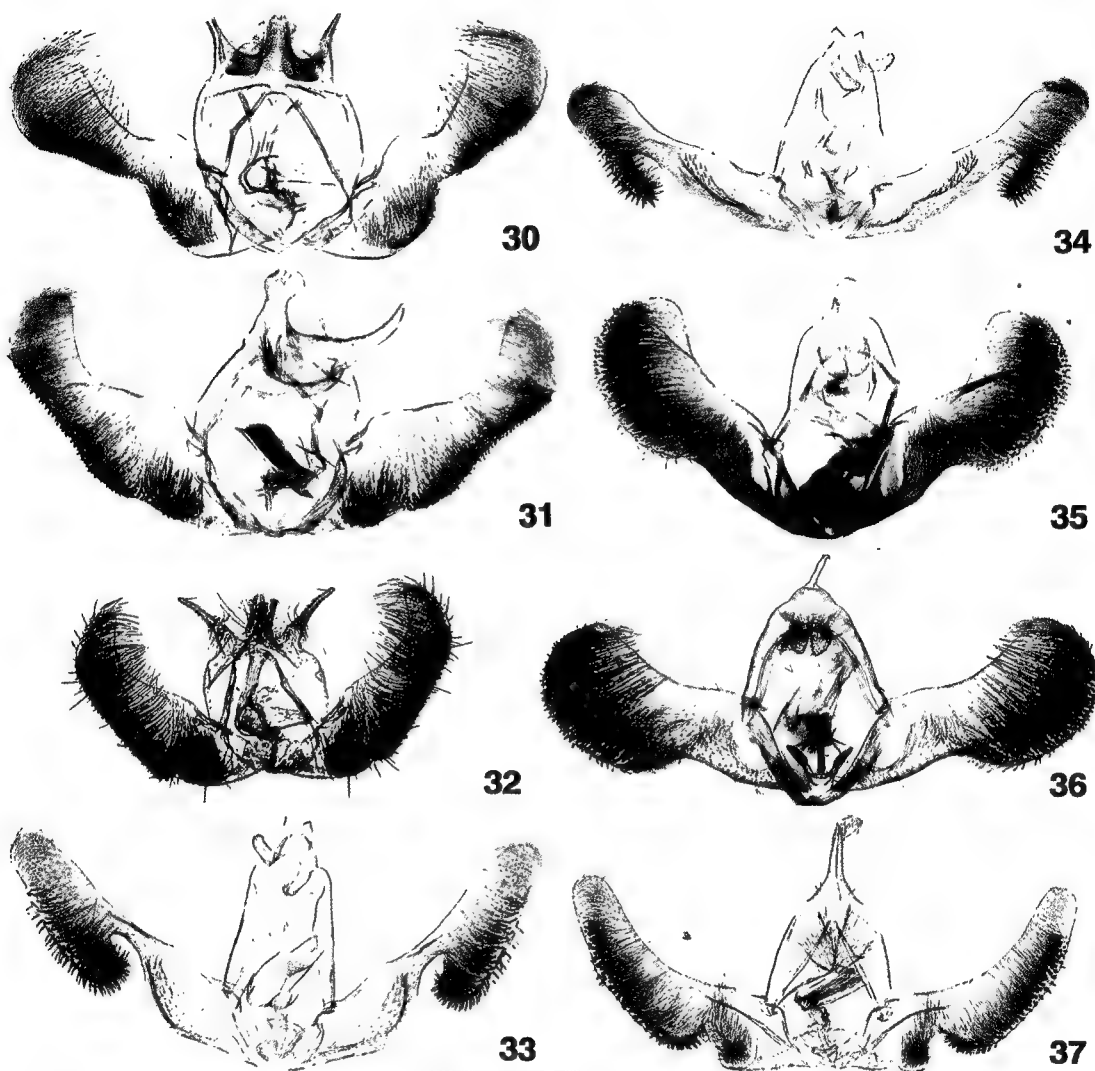
Epinotia contrariana: Kennel, 1921, 606-607, pl. 22, figs 62- 63.

Epinotia contrariana: Kuznetsov, 1967, Trudy Zool. Inst., **41**: 60; 1978, 485, 496, figs 418-5, 428-3; Kawabe, 1972, Tinea, **9**: 243, figs 3, 7, **11**; 1982, **1**: 125, **2**: 175, pl. 26, fig. 48; Kuznetsov & Jalava, 1988, Nota lepid., **11**: 135; Byun & Park, 1992, **8**: 203, figs 4, 13.

Adult (Fig. 7). Wing expanse, ♂ 11.5~12.5mm, ♀ 13.5mm. Head pale ochereous; vertex mixed with dark brown. Antenna brownish gray, with pale ochereous annulations. Labial palpus short, pale ochereous; median segment irrorated with dark brown outwardly; terminal segment shortly exposed, drooping, almost concealed in projecting scales of second segment or scarcely exposed. Thorax brownish black, with a creamy white spot at posterior crest; tegula creamy white at apical 2/3. Abdomen dark gray. Forewing with costal fold from base to 1/3 of costa; hair pencils from base to 4/5 of costal fold; ground color brownish black; all markings inconspicuous, almost blending with ground color; three creamy white or white patches present, one of them on basal 2/3 of costa, and rest dorsally, small one on base and largest one on middle; ocelloid patch distinctly marked by metallic gray, containing parallel orangeish blots; cilia brownish gray, with a brownish black subbasal line. Hindwing dark brownish gray; cilia concolorous, with a dark subbasal line.

Male genitalia (Fig. 27). Uncus deeply bifurcated from its middle, with pointed apex. Socius triangular, broad basally, narrower terminally, bearing dense hairs. Valva curved near middle, with narrow neck, broadly concave at middle of ventral margin; cucullus bearing with stout spines along ventral margin from base to 4/5; sacculus with a large spines cluster near costa. Aedeagus short, simple, tapering towards top; cornuti a sheaf of long scale-like spines.

Female genitalia (Fig. 41). Sterigma well-sclerotized, bearing many dents. Ostium bursae cup-shaped. Ductus bursae with sclerotized band post-medially; ductus seminalis originating at middle, before sclerotized band. Corpus bursae globular, spinulate on inner surface: signa two, long blade-like.



Figs 30-37. *Epinotia* spp., male genitalia: 30. *E. pinicola* Kuznetsov; 31. *E. rubiginosana koraiensis* Falkovitsh; 32. *E. piceae* (Issiki); 33. *E. ustulana* (Hübner); 34. *E. parki* sp. nov.; 35. *E. thapsiana* Zeller; 36. *E. majorana* (Caradja); 37. *E. ulmicola* Kuznetsov.

Material examined. [GW]- 1 ♂, Wonchang-Gogae, Chuncheon, 12. VI. 1990 (S.W. Cho), CIS-gen. sl. no. 2903; 1 ♂, Mt. Samak, 22. VI. 1989 (K.T. Park & B.K. Byun), CIS-gen. sl. no. 2904; 1 ♂, Mt. Seolak, 15. VI. 1993 (B.K. Byun), FRI. [CB]- 1 ♀, Mt. Weolak, 7. VI. 1997 (Bae, Paek, Lee, Oh & Ahn), UIB. **JAPAN**-1 ♂, 1 ♀, Tomakomai, Hokkaido, 18-20. VII. 1990 (Y.S. Bae), UIB-gen. sl. no. UIB-183.

Distribution. Korea (GW, CB) Japan, China, and Russia (Amur, Ussuri).

Host plant. Korea: unknown. Japan: *Astilbe microphylla* Knoll. (Saxifragaceae), (Kawabe, 1972).

Remarks. A transpalearctic species. The species is easily distinguished from the other known species

by the following characters: forewing bronwish black, with three distinct yellowish-white patches on the basal half of the wing. The genitalic characters of this species are similar to those of Russian species *E. nemorivaga* Tengström, but the present species have the broader and shorter valva.

***Epinotia rubricana* Kuznetsov, 1968** 굴빛애기잎말이나방

(Figs 8, 28, 42)

Epinotia rubricana Kuznetsov, 1968, Ent. Obozr., **47**: 575, figs 8-9. Type locality: Russia (Vladivostok); 1970, **49**: 439, fig. 7b; Kawabe, 1970, **8**: 204, figs 7, 19, 27; 1982, **1**: 126, **2**: 174, pl. 27, fig. 1; Park & Ahn, 1988, **18**: 95-96, figs 1, 14.

Adult (Fig. 8). Wing expanse, 14~15 mm. Sexual dimorphism not pronounced; fore wing of male slightly darker than that of female. Head pale ochereous, mixed with gray. Antenna brownish gray. Labial palpus pale ochereous; outside of basal and terminal segments irrorated with dark brown. Thorax ochereous, scattered with dark brown. Abdomen brownish gray. Forewing narrow, with a costal fold reaching to 1/3 of costa; ground color ochereous, scattered with dark brownish and pale orange; markings ill-distinct; costa with seven pairs of whitish streaks from apex to base; basal patch and central fascia confluent; terminal patch slender, oblique, overlaid with pale orange; apical spot small, distinct; ocelloid patch weakly developed, pale ochereous, irrorated with dark ochereous, weakly edged, and containing two or three black dashes medially; cilia ochereous, with a dark fuscous subbasal line. Hindwing grayish brown; cilia pale gray, with a dark subbasal line

Male genitalia (Fig. 28). Uncus moderately broad, with pointed apex. Tegumen rather short. Socius rather large, triangular, broad basally, narrower terminally, bearing dense hairs. Valva slightly narrow at middle; cucullus clavate, bearing stout spines along ventral margin from base to 2/3; sacculus with a spines cluster near middle. Aedeagus short and simple.

Female genitalia (Fig. 42). Sterigma divergent sideways in from of lobes. Ostium bursae U-shaped. Ductus bursae with sclerotized band medially; ductus seminalis originating before sclerotized band. Corpus bursae globular, spinulate on inner surface except around signa, with a spinous patch before corpus bursae: signa double, blade-like, slightly arched.

Material examined: [GG]- 1 ♀, Gwangleung, 31. V. 1986 (U. Park), CIS; 2 ♀, same locality, 13. VIII. 1986 (K.T. Park & M.K. Ko), CIS-gen. sl. no. 1552; 1 ♂, same locality, 4. VIII. 1988 (K.T. Park), CIS-gen. sl. no. 3485.

Distribution. Korea (GG), Japan, and Russia (Amur).

Host plant. Korea: unknown. Japan: *Alnus japonica* Steud. (Betulaceae), (Kawabe, 1982).

Remarks. The species is similar to *E. ulmicola* in the superficial appearance, but easily distinguished from the latter by lacking whitish marking on the median part of the forewing.

***Epinotia bicolor* (Walsingham, 1900) 노랑줄애기잎말이나방**
(Figs 9, 29, 43)

Pelatea bicolor Walsingham, 1900, Ann. Mag. Nat. Hist., (7) **6**: 335. Type locality: Japan; Issiki, 1957: 64, pl.10, fig. 300; Liu et al., 1983: 51, figs 287.

Epinotia bicolor: Kuznetsov, 1976, **43**: fig. 1 (♂-genitalia); Kawabe, 1982: **1**: 123, **2**: 174, pl. 26, fig. 28; Kawabe, 1989, (2): 55, fig. 86; Park, 1983, **3**: 36; Jaros et al., 1992, **9**: 84.

Adult (Fig. 9). Wing expanse, 11~13mm. No sexual difference in wing maculation and size. Head and antenna dark brownish gray. Labial palpus short, dark brownish gray, except pale gray inner side; second segment densely clothed with long scales above; terminal segment almost concealed in projecting scales of second segment, or scarcely exposed. Thorax including tegula dark brownish gray. Abdomen gray. Forewing broad, elongate, without costal fold; ground color dark brownish gray; all markings conspicuous; costa with four pairs of white yellowish streaks along apical half, inner side of costa suffused with dark gray; basal and terminal patches almost blending with ground color; central fascia well-developed, yellowish orange; ocelloid patch not formed, and this area dotted with dark gray; cilia concolorous with ground color, with a darker subbasal line. Hindwing light grayish brown; cilia pale gray, with a dark subbasal line.

Male genitalia (Fig. 29). Uncus broad, bifid at top. Tegumen rather short. Socius rather long and narrow, bearing long hairs. Valva straight costally, slightly concave ventrally; cucullus clavate, bearing stout spines along convex ventral margin; sacculus with a patch of 10-12 strong spines below apex. Aedeagus moderate, with a projection at 2/3 of ventral wall.

Female genitalia (Fig. 43). Papillae anales slender. Apophyses posteriores long, about 2 times as long as anteriores. Sterigma well-sclerotized, with two lobe, especially at lateral portion in crescent shaped. Ductus bursae as long as corpus bursae, with sclerotized part anteriorly; ductus seminalis originating before sclerotized band. Corpus bursae semioval; signa two, horn-like, short.

Material examined. [GW]- 13 ♂, 3 ♀, Chuncheon, 19. VI. 1990, 11. VI. 1989, 12. VIII. 1988, 11. VI. 1989, 19. VI. 1990, 26. VI. 1984, 5. VI. 1992, 19. VI. 1990, 22. VIII. 1991, 21. VI. 1985, 21. VI. 1985, 21. VII. 1992 (K.T. Park etc.), CIS; 1 ♂, Naemyon, Hongcheon 14. VIII. 1987 (K.T. Park), CIS; 1 ♂, Jeongseon, 30. VII. 1991; 1 ♀, Sogumgang, 7. VII. 1988 (K.T. Park), CIS; 2 ♂, 1 ♀, Seomyon, Yangyang, 4. VI. 1987 (K.T. Park), CIS; 1 ♂, Mt. Jeombong, 20. VI. 1992 (K.T. Park), CIS; 1 ♀, same locality, 13. VII. 1997 (Paek, Lee, Jang, Choi & Kim), UIB; 1 ♂, 2 ♀, Mt. Seolak, 10. VIII. 1989 (K.T. Park), CIS; 1 ♂, Mt. Seolak, 15. VI. 1993 (B.K. Byun), CIS; 1 ♂, Mokuje, Mt. Seolak, 16. VI. 1993 (B.K. Byun), CIS; 1 ♀, 2 ♂, 2 ♀, Mt. Samak, 22. VI. 1989 (B.K. Byun), CIS; 2 ♂, 2 ♀, Mt. Dukga, 24. VII. 1997 (Y.S. Bae, M.K. Paek & N.H. Ahn), UIB; 5 ♂, Mt. Daedeok, 11. VII. 1997, 8. VIII. 1997 (Y.S. Bae & N.H. Ahn), UIB; 3 ♂, Mt. Chiak, 10 VIII. 1997 (Y.S. Bae & N.H. Ahn), UIB; 5 ♂, Mt. Kyebang, 7. VIII. 1997 (Y.S. Bae & N.H. Ahn), UIB. [GG]- 3 ♂, 1 ♀, Gwangleung, 27. VI. 1986; 4 ♂, 3 ♀, 7. VIII. 1986, 14. V. 1986 (K.T. Park etc.), CIS; 2 ♂, Mt. Myongji, 26. VI. 1992 (K.T. Park), CIS; 1 ♀, Suwon, 22. VI. 1976 (K.T. Park), CIS; 6 ♂, 5 ♀, Deokjeok Is., Buk-ri, 24. VI. 1997 (Y.S. Bae & N.H. Ahn), UIB; 2 ♂, 2 ♀, Ganghwa Is., 20. VI. 1997 (B.W. Lee), UIB; 1 ♂, Is. Daebu, 28,

VI. 1997 (M.K. Paek), UIB; 2 ♂, Mt. Hwaya, 18. VII. 1997 (Y.S. Bae, M.K. Paek, B.W. Lee, K.S. Oh & N.H. Ahn), UIB. [CN]- 1 ♂, Mt. Gaya, 15. VI. 1997 (Bae, Paek, Lee, Oh & Ahn), UIB. [JB]- 1 ♂, 2 ♀, Naebyun-san, Buan, 4. VIII. 1992 (K.T. Park & B.K. Byun), CIS; 12 ♂, 5 ♀, Mt. Mireuk, 14. VI. 1997 (Bae, Paek, Lee, Oh & Ahn), UIB. [GN]- 2 ♂, 1 ♀, Woopo, 28. VII. 1997 (M.K. Paek), UIB.

Distribution. Korea (NK, GW, GG, CB, CN, JB, GN), Japan, China, Taiwan, and India (Assam).

Host plants. Korea: unknown. Japan: *Quercus glauca* Thunb., *Q. phillyraeoides* A. Gray, and *Q. acutissima* Carruth (Ulmaceae), (Kawabe, 1982).

Remarks. The species has a characteristically broad, yellowish band on the forewing medially. Jaros *et al.* (1992) stated that adults of this species were collected in the climax oak forest (virgin forest) and the climax maple mixed forest in N. Korea.

***Epinotia pinicola* Kuznetsov, 1969 가문비에기잎말이나방 (신칭)**

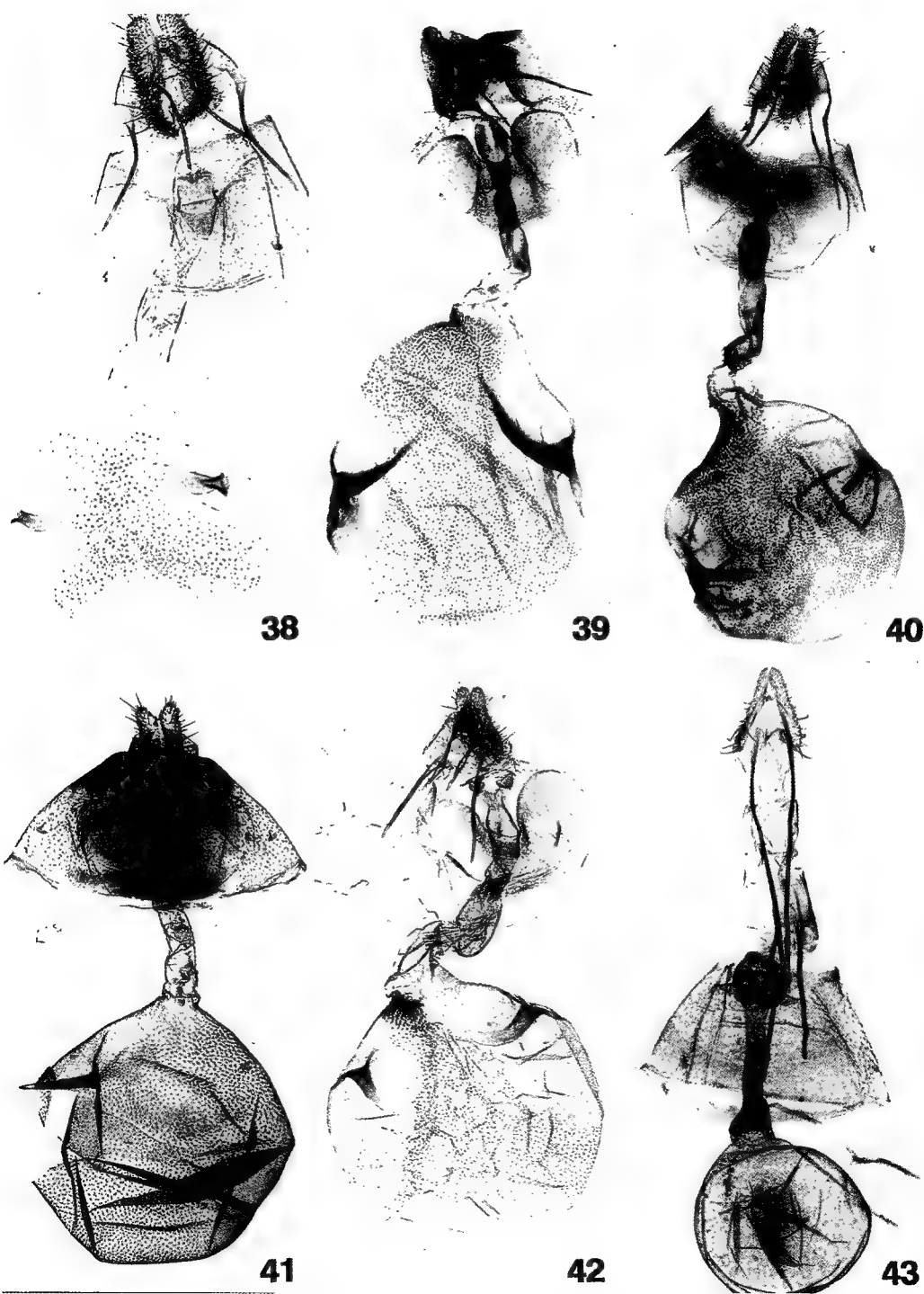
(Figs 10, 30, 44)

Epinotia pinicola Kuznetsov, 1969, Ent. Obozr., **48**: 368-370, figs 21, 22. Type locality: Russia (Kunashir Is., Kuril Is.); Kawabe, 1982, **1**: 127, **2**: 175, pl. 27, figs 9, 10; Suzuki & Komai, 1984, (22): 104-105.

Adult (Fig. 10). Wing expanse, 13~14mm. No sexual difference in wing maculation. Head ochreous; vertex mixed with dark gray. Antenna pale brown, finely ringed with fuscous. Labial palpus pale ochreous; outside of median and terminal segments irrorated with dark gray. Thorax creamy white, sprinkled with grayish fuscous. Abdomen dark gray, with anal tufts ochreous. Forewing narrow, with narrow costal fold reaching to about middle of costa; ground color creamy white, mixed with gray and coarsely strigulate with dark brown; markings obscure, grayish brown, out edge suffused with fuscous; costa of male with four or five pairs of whitish streaks from apex to 2/3 of base; basal and subbasal fascia obscurely defined; central fascia narrow, interrupted below middle; terminal patch slender, oblique; apical spot small, distinct; ocelloid patch obscurely developed, medially containing three or four black dots; cilia creamy white, sprinkled with gray, and with a fuscous subbasal line. Hindwing grayish brown; cilia pale gray, with a dark gray subbasal line.

Male genitalia (Fig. 30). Uncus rather short, slightly emarginated at top. Socius rather short, strongly sclerotized, gradually narrowing towards top, with short hairs above. Henion distinct, a pair of band-like sclerotization from middle of gnathos to dorsal part of anellus, often present. Valva curved near middle, with narrow neck, and with a distinct protuberance at upper side of basal cavity; cucullus clavate, bearing stout spines along ventral margin from base to 2/3; sacculus strongly sclerotized, with a large spines cluster below apex. Aedeagus short, simple, tapering distally.

Female genitalia (Fig. 44). Eighth tergite distinct, well-sclerotized. Papillae anales broad, well-sclerotized, short hairy. Sterigma subquadrate, bifurcate, bearing many denticles posteriorly. Ostium bursae well-sclerotized in form of rather long cylindrical. Ductus bursae with a sclerotized part medially; ductus seminalis originating in sclerotized part. Corpus bursae spinulate on inner surface, rather dense at



Figs 38-43. *Epinotia* spp., female genitalia: 38. *E. rasdolnyana* (Christoph); 39. *E. exquisitana* (Christoph); 40. *E. pentagonana* (Kennel); 41. *E. contrarianana* (Christoph); 42. *E. rubricana* Kuznetsov; 43. *E. bicolor* (Walsingham).

entrance, with two small blade-like signa.

Material examined. [GW]- 4 ♂, 2 ♀, Mt. Obong, 1. VII. 1993 (B.K. Byun), FRI-gen. sl. no. 161-163, 167; 1 ♂, Bangmyoun-ri, 30. VI. 1992 (K.T. Park & B.K. Byun), CIS-gen. sl. no. 3764; 1 ♀, Mt. Samak, 22. VI. 1989 (K.T. Park), CIS; 1 ♂, Mt. Odae, 26. VI. 1989 (K.T. Park), CIS-gen. sl. no. 3337; 1 ♀, same locality, 6. VIII. 1989 (K.T. Park), CIS-gen. sl. no. 3843.

Distribution. Korea (GW), Japan, and Russia (Amur).

Host plant. Korea: Unknown. Japan: *Pinus pumila* Regel (Pinaceae), (Suzuki & Komai, 1984).

Remarks. This species closely resembles *E. rubiginosana*, but differs from the latter in the genital character, as described above. The species is recorded for the first time from Korea.

***Epinotia rubiginosana koraiensis* Falkovitsh, 1965** 잣에기잎말이나방

(Figs 11-12, 31, 45)

Epinotia rubiginosana koraiensis Falkovitsh, 1965. Ent. Obozr., **44**: 426. Type locality: Russia (Okeanskaya; East Asia); Oku, 1968, **36**: 228-229. figs 1-5, 2-5, pl. 8e; Kawabe, 1982, **1**: 126, **2**: 175, pl. 26, figs 52, 53; Suzuki & Komai, 1984: 104; Jaros, et al. 1992, **9**: 87; Byun et al. 1995: 105.

Adult (Figs 11-12). Wing expanse, ♂ 13~14 mm, ♀ 14~17 mm. No sexual difference in wing maculation. Head and antenna yellowish gray or dark brownish gray. Labial palpus yellowish gray or dark gray, median segment strongly dilated. Thorax grayish brown or dark gray, rarely with an admixture of ocherous scales. Abdomen brownish gray, with ocherous anal tufts. Forewing narrow, without costal fold; ground color pale ocherous, mixed with silver gray and fuscous; markings grayish brown or orangeish brown, irrorated with fuscous; costa with six pairs of white ocherous streaks from apex to 1/3 of base; basal patch distinct, outer edge angulated at middle; dorsal half between basal patch and central fascia tinged with creamy white; terminal patch narrow, rarely mixed with fuscous; apical spot small; ocelloid patch developed, with silvery metallic streak laterally, and marked with three or four black dashes medially; cilia dark gray, with a blackish subbasal line. Hindwing dark brownish gray; cilia gray, with a dark gray subbasal line.

Male genitalia (Fig. 31). Uncus large, narrow at base, with emarginated round apex. Socius long, strongly sclerotized, gradually narrowing towards top, with short hairs above. Henion distinct, a pair of band-like sclerotization from middle of gnathos to dorsal part of anellus, often present. Valva evenly curved, broad basally, without narrow neck; cucullus clavate, widely concave at upper margin of below apex, bearing stout spines along ventral margin from base to below apex; sacculus strongly sclerotized, with a large spines cluster below apex. Aedeagus short, simple, tapering distally; cornuti a bundle of long scale-like spines.

Female genitalia (Fig. 45). Papillae anales broad, well-sclerotized, fairly narrowed towards ostium bursae. Apophyses anteriores slender. Sterigma divergent sideways, bearing many dents. Ostium bursae well-sclerotized in form of short cylindrical. Ductus bursae folded one time at middle, with a sclerotized

band posteriorly; ductus seminalis originating before sclerotized band. Corpus bursae spinulate on inner surface, rather dense at entrance, with two blade-like signa.

Material examined. [GW]- 13 ♂, 11 ♀, Chuncheon, 13. VI. 1989, 19. VI. 1986, 23. VI. 1989, 11. VI. 1989, 13. VI. 1989, 19. V. 1989, 29. V. 1989, 21. VII. 1992, 15. VI. 1992, 16. V. 1986, 29. VI. 1987, 21. VI. 1985, 19. VI. 1990, 29. V. 1989, 20. VII. 1987, 12. VIII. 1991 (K.T. Park, etc.), CIS; 1 ♂, campus of Kangwon Nat. Univ., 3. VI. 1992, CIS; 1 ♂, Gotan, Chuncheon, 15. VIII. 1992, CIS; 1 ♀, Deokduwon, Chuncheon, 5. VII. 1993, CIS; 6 ♂, 15 ♀, Mt. Obong, 1. VII. 1993, CIS; 1 ♂, 1 ♀, Seongdong, Hongcheon, 6. VI. 1986, CIS; 1 ♀, Naemyon, Hongcheon, 14. VIII. 1987, CIS; 1 ♂, Bongmyongri, Chuncheon, 23. VII. 1992, CIS; 1 ♀, Pyongchang, 31. VII. 1991, CIS; 1 ♂, Sogumgang, 7. VII. 1988, CIS; 1 ♂, Mt. Daeam, 28. VII. 1988, CIS; 2 ♂, 1 ♀, Whacheon, 2. VII. 1985, CIS; 1 ♂, ditto, 2. VII. 1985, CIS; 1 ♂, 2 ♀, Seomyon, Yangyang, 30. VI. 1987, CIS; 1 ♀, Mt. Chiak, 23. VI. 1977, CIS; 1 ♀, Mt. Jeombong, 10. VIII. 1992, CIS; 1 ♀, Mt. Kwangduk, 23. VI. 1994, CIS; 3 ♂, 1 ♀, Mt. Odae, 26. VI. 1989, CIS; 3 ♂, 2 ♀, Mt. Samak, 13. VI. 1990, CIS; 1 ♂, Mt. Yaksu, 8. VIII. 1989, CIS; 1 ♀, Mt. Seolak, 10. VIII. 1989, CIS; 1 ♂, 5 ♀, Jeongseon, 30. VII. 1991, CIS; 2 ♂, Mt. Dukga, 24. VII. 1997 (Y.S. Bae, M.K. Paek & N.H. Ahn), UIB. [GG]- 1 ♂, 1 ♀, Gwangleung, 3. VI. 1988, CIS; 1 ♀, Suwon, 22. VI. 1976, CIS; 1 ♀, Mt. Myongji, 26. VI. 1992, CIS; 1?, Mt. Suri, 15. VI. 1990, CIS. [JB]- 1 ♂, 1 ♀, Mt. Daedun, 22. V. 1992, CIS. [JN]- 1 ♀, Is. Sinsido, 26. VII. 1980, CIS. [CN]- 1 ♂, Mt. Gyeryong, 20. VI. 1980, CIS.

Distribution. Korea (NK, GW, GG, JB, JN, CN), Japan, China, and Russia (Ussuri).

Host plants. Korea: unknown. Japan: *Pinus koraiensis* Sieb. et Zucc., *P. densiflora* Sieb. et Zucc., and *P. strobus* L. (Pinaceae), (Oku, 1968).

Remarks. This species is originally described from the East Siberia as a pest of *Pinus koraiensis*. Although it is somewhat similar to *E. pinicola* and Japanese species, *Petrova cristata* (Walsingham), but can be separated from the latter by the grayish brown forewing mixed with leaden gray. Moths appear from May to July in Korea. It has been known that larvae feed on leaves of *Pinus* species.

***Epinotia piceae* (Issiki, 1961) 침엽애기잎말이나방**

(Figs 13-14, 32)

Panopila piceae Issiki, 1961, Shinyoju Kagai Shogarui: 36, pl. 11, fig. 26 (*Panopia*). Type locality: Japan.

Epinotia piceae: Oku, 1968, **36**: 228, figs 1-3, 2-3, pl. 8c; Kuznetsov, 1969, **48**: 352-372; Kawabe, 1982, **1**: 127, **2**: 175, pl. 17, fig. 13; Suzuki & Komai, 1984: 105; Komai, 1991: 6; Jaros et al., 1992, **9**: 93.

Epinotia elatana Falkovitsh, 1965, 44(2): 426, figs 19-20.

Adult (Figs 13-14). Wing expanse, ♂ 12~14mm. No sexual difference in wing maculation. Head and antenna brownish gray. Labial palpus pale yellowish gray; terminal segment irrorated with brownish gray, shortly exposed. Thorax brownish gray, with ochreous yellow tegula. Abdomen brownish gray. Forewing

narrow, with a narrow costal fold from base to 1/3 of costa; ground color blackish brown; costa with five pairs of creamy white streaks from apex to 2/3 of base; basal patch and central fascia confluent; a large, well-defined and ochereous patch present near middle of dorsum; space between central fascia and terminal patch with a long plumbeous streak; terminal patch sometimes with an admixture of ochereous yellow scales; apical spot large, distinct, with plumbeous streak beneath of apical spot; ocelloid patch not formed, with a plumbeous streak, and sometimes tinged with ochereous yellow; cilia brownish gray, except on below apex creamy white, with a blackish brown subbasal line. Hindwing grayish brown, becoming darker apically; cilia pale brownish gray, with a darker subbasal line.

Male genitalia (Fig. 32). Uncus deeply bifurcated from its middle, with pointed apex. Socius slender, strongly sclerotized, with densely long hairs. Henion distinct, a pair of band-like sclerotization from middle of gnathos to dorsal part of anellus, often present. Valva evenly curved, broad basally, gradually narrowing apically, with a slight concavity at lower margin above sacculus, and without narrow neck; cucullus suddenly concave at upper margin of below apex, bearing stout spines along ventral margin from base to below apex; sacculus strongly sclerotized, with a large spines cluster below apex. Aedeagus short, simple, tapering distally.

Material examined. [GW]- 1 ex, Bongmyongri, Chuncheon, 30. VI. 1992 (CIS). [NK]- 1 ♂, alt. 1370 m, Changpeksan, Samjiyon, 13. VII. 1985 (J. Harelka), Czech Academy of Sciences. JAPAN- 1 ♀, alt. 1300 m, Kisojihar, Nagano Prefecture, 23-28. VI. 1990 (Y.S. Bae), UIB; 1 ♀, Mt. Wasamat, 23. VII. 1991 (T. Yasuda & Y.S. Bae), UIB.

Distribution. Korea (GW, NK), Japan, and Russia (Sakhalin, Kuril Is., Primorye).

Host plants. Korea: unknown. Japan: *Abies mariesii*, *A. sachalinensis*, and *Picea* spp. (Pinaceae), (Oku, 1968).

Remarks. An eastern Palaearctic species. It was previously known from Primorye, Sakhalin, Kuril Islands and Japan (Kuznetsov, 1986). Recently it is reported from N Korea by Jaros *et al.* (1992). This small species has been known as a fir and spruce in Japan (Kawabe, 1982).

***Epinotia ustulana* (Hübner, [1813]) 홍점애기잎말이나방**

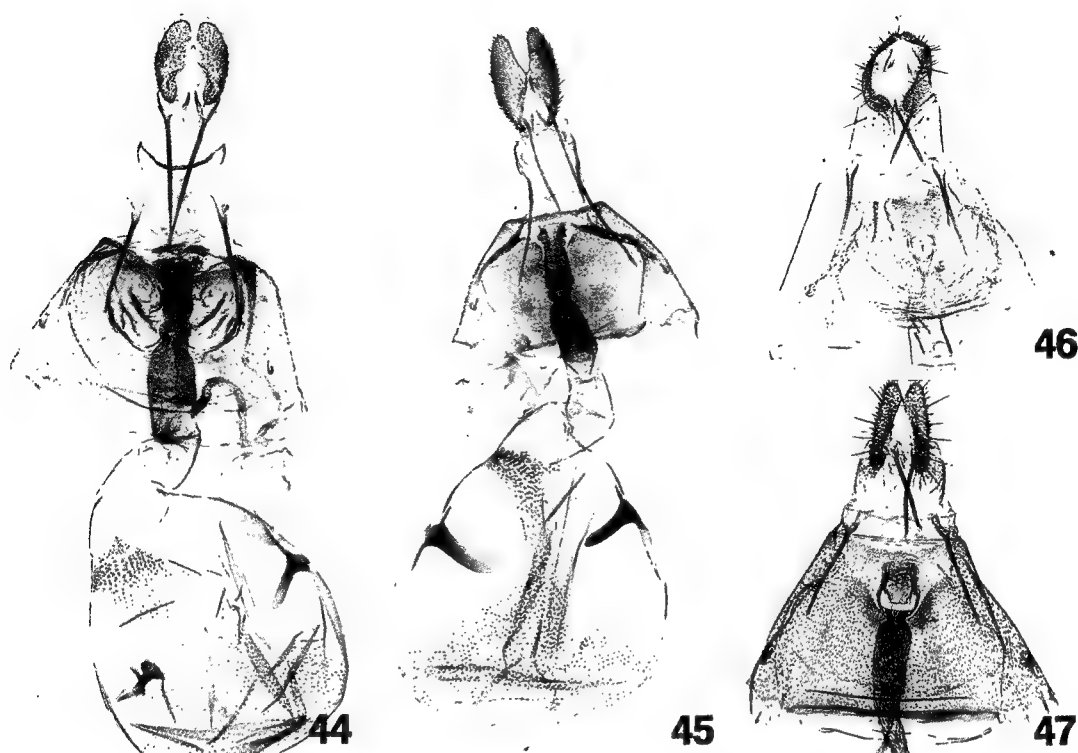
(Figs 15-16, 34, 46)

Tortrix ustulana Hübner, [1813], Samml. eur. Schmett., 7: pl. 36, fig. 231. Type locality: Europe.

Epinotia ustulana: Kuznetsov, 1978: 488, 497; Kawabe, 1982, 1: 124, 2: 175, pl. 26, fig. 41; Park, 1983, 3: 36.

Epiblema denigratana sensu Issiki (nec Kennel), 1957, 1: 61, pl. 9, fig. 284.

Adult (Figs 15-16). Wing expanse, ♂ 13-14, ♀ 15~16 mm. Sexual dimorphism not pronounced; fore wing of female darker than that of male. Head and labial palpus pale ochereous to brownish ocher. Antenna dark brown, finely ringed with ochereous; scape ochereous. Thorax with tegula deep reddish orange; posterior crest fuscous, mixed with orangeish scales. Abdomen dark gray to pale gray, with ochereous anal tufts. Forewing broad, with broad costal fold reaching to about middle of forewing; ground



Figs 44-48. *Epinotia* spp., female genitalia: 44. *E. pinicola* Kuznetsov; 45. *E. rubiginosana koraiensis* Falkovitsh; 46. *E. ustulana* (Hübner); 47. *E. majorana* (Caradja).

color ochreous, suffused with gray; markings indistinctly developed; costa of male with four pairs of whitish streaks from apex to middle of forewing, and in female six pairs of whitish streaks from apex to 1/3 of base; basal patch angulated in middle, overlaid with fuscous; central fascia deep reddish orange, scattered with fuscous on costal 1/3; terminal patch slender, oblique and deep reddish orange; apical spot small, distinct, deep reddish orange; ocelloid patch weakly developed, medially containing three or four black dashes; cilia reddish ochreous, with a fuscous subbasal line. Hindwing grayish brown; cilia pale gray or pale ochreous, with a grayish brown subbasal line.

Male genitalia (Fig. 33). Uncus rather broad, shortly bifurcated, with pointed apex. Socius moderate, narrow, poorly hairy. Valva rather narrow, with well-defined angle at lower margin; neck narrow; cucullus rather elongate; sacculus well-developed. Aedeagus short, rather broad at base.

Female genitalia (Fig. 46). Papillae anales slender. Apophyses posteriores short, 0.7 times as long as apophyses anteriores. Sterigma large subtriangular. Ostium bursae cup-shaped. Ductus bursae with sclerotized band post-medially; ductus seminalis originating from sclerotized band. Corpus bursae globular, spinulate on inner surface: signa double, horn-like, with rounded apices, different in size.

Material examined. [GW]- 2 ♂, chuncheon, 12. VIII. 1988 (K.T. Park), CIS; 9 ♂, 1 ♀, same locality, 19. VI. 1990, 11. VI. 1989, 12. VI. 1989, 15. VI. 1992, 25. VI. 1986, 3. VII. 1990, 21. IX. 1988, 2. VII. 1989 (K.T. Park, etc.), CIS1; ♀, Jiamri, chuncheon, 3. VI. 1993 (B.K. Byun), CIS; 2 ♂, Bong-

myoungri, chuncheon, 30. VI. 1992 (K.T. Park), CIS; 1 ♀, Sogumgang, 6. VII. 1988 (K.T. Park), CIS; 3 ♂, Whacheon, 2. VII. 1985 (K.T. Park), CIS; 6 ♂, 1 ♀, Seomyon, Yangyang, 4. VI. 1987 (K.T. Park), CIS; 1 ♂, Mt. Yaksu, 8. VIII. 1989 (K.T. Park), CIS; 1 ♀, Mt. Obong, 1. VII. 1993; 2 ♂, Mt. Palbong, 3. IX. 1990; 1 ♂, Mt. Samak, 22. VI. 1989, CIS; 1 ♂, Mt. Daedeok, 11. VII. 1997 (Y.S. Bae & N.H. Ahn), UIB; 1 ♂, Mt. Kwangduk, 19 VIII. 1997 (M.K. Paek), UIB. [GG]- 1 ♂, Yongin, 19. VI. 1981 (Ha), CIS; 1 ♂, Ipori, Yeosu, 20. VII. 1990 (K.T. Park, etc.), CIS; 1 ♀, Mt. Chonma, em. 23. V. 1997 (M.K. Paek), UIB, ex. spun leaves of *Rubus crataegifolius* B. [CB]- 1 ♂, Mt. Sokri, 19. VIII. 1993 (K.T. Park & B.K. Byun), CIS; 1 ♂, Mt. Weolak, 18. VIII. 1993 (K.T. Park & B.K. Byun), CIS; 1 ♂, Mt. Ingyuon, 23. VII. 1997 (Y.S. Bae), UIB. [GN]- 1 ♂, Mt. Jiri, 22. VIII. 1981 (Choe), CIS.

Distribution. Korea (GW, GG, CB, GN), Japan, China, Russia, and Europe.

Host plants. Korea: *Lycium chinense* M. and *Rubus crataegifolius* B. (Park, 1983b).

Remarks. A Transpalearctic species. Moths appear from June to September in Korea. The male genitalia are closely similar and allied to those of the Thailand species, *E. siamensis* Kawabe, 1989, but the species can be separated from the latter by the wing pattern and the female genitalic character.

***Epinotia parki* Bae, sp. nov. 황무늬애기잎말이나방 (신칭)**

(Figs 17, 34)

Adult (Fig. 17). Wing expanse, ♂ 15.5mm. Head and labial palpus pale ochreous; vertex mixed with brown. Antenna pale brown; scape pale ochreous. Thorax with tegula deep reddish orange. Abdomen brownish gray, with ochreous anal tufts. Forewing broad, with broad costal fold reaching to about middle of costa; ground color creamy white, mixed with silver gray; markings indistinctly developed, deep reddish orange, mixed with fuscous; costa with four pairs of whitish streaks from apex to middle of forewing; basal patch indistinct; central fascia deep reddish orange, scattered with fuscous on costal 1/3; terminal patch narrow, oblique and deep reddish orange; apical spot small; ocelloid patch developed, creamy white, medially containing four black dashes; cilia pale grayish ochreous, with a fuscous subbasal line. Hindwing grayish brown; cilia pale gray, with a grayish brown subbasal line.

Male genitalia (Fig. 34). Closely related to those of *E. ustulana*, but are distinguished from them by the following points: valva without defined angle; cucullus shorter and slender ventrally than those of *ustulana*.

Material examined. Holotype: ♂, Chuncheon, Kangwon Province, Korea, 15. VI. 1995 (M.S. Go & J.S. Lee), CIS-gen. sl. no. UIB 121. Paratype: 1 ♂, Mt. Daedeok, Taebaek, Kangwon Province, Korea, 8. VIII. 1997 (Y.S. Bae & N.H. Ahn), UIB.

Distribution. Korea (GW).

Host plant. Unknown.

Remarks. This new species is very closely allied to the preceding species, *E. ustulana*, but differs from the latter in the genital character, as described above. The species is named in Professor K. T. Park, who is the chief of CIS.

***Epinotia thapsiana* (Zeller), 1847 산형애기잎말이나방 (신칭)**

(Figs 18, 35)

Penthina thapsiana Zeller, 1847, Isis, Leipzig, 1847: 654. Type locality: Europe.*Epinotia* (*Steganoptycha*) *thapsiana*: Swatschek, 1958: 170; Hannemann, 1961: 166, fig. 335, pl. 14, fig. 18.*Epinotia thapsiana*: Kuznetsov, 1978: 488, 501, figs 412-2, 419-7, 431-1; 1988, Nota. Lepid., **11**: 135.

Adult (Fig. 18). Wing expanse, ♂ 13 mm. The specimen partly descaled, because insufficiently examined. Head ochreous, mixed with grayish scales. Antenna pale ochreous, finely ringed with brown. Labial palpus pale ochreous, outside of basal and median segments irrorated with brownish gray. Thorax with tegula ochreous, mixed with fuscous scales. Forewing broad, with narrow costal fold reaching to about 1/3 of forewing; ground color creamy white; markings distinctly developed; costa with five pairs of whitish streaks from apex to about 1/3 of base; basal patch well-defined, outer edge produced medially; central fascia descaled; terminal patch slender, oblique, confluent with central fascia; apical spot small; ocelloid patch well-defined; cilia descaled, creamy white, mixed with gray. Hindwing pale grayish brown; cilia pale ochreous, with a grayish brown subbasal line.

Male genitalia (Fig. 35). Uncus long and narrow, ribbon-like, with truncated apex. Socius rather short and broad, with densely long hairs. Gnathos a weak transverse band. Valva broad, evenly curved, with a slight concavity at ventral margin, and without narrow neck; cucullus clavate, broad, bearing stout spines along ventral margin; sacculus without stout spines cluster. Aedeagus short and broad, same length of diameter, with truncate top; cornuti five long and short scale-like spines.

Material examined. [GG]- 1 ♂, Gwangleung, 7. VIII. 1986 (K.T. Park & U. Park), CIS-gen. sl. no. 2889.

Distribution. Korea (GG), Russia, Asia Minor, and Europe.

Host plants. Korea: unknown. Europe: *Laserpitium gallicum* L., *Foeniculum officinale* All., *Thapsia villosa* L., *Ferula communis* L., *Ligusticum pyrenaicum* Gouan, and *Crithmum maritimum* L. (Umbelliferae), (Hannemann, 1961).

Remarks. Only a single male was collected. The species is recorded for the first time from Korea.

***Epinotia majorana* (Caradja, 1916) 어수리애기잎말이나방 (신칭)**

(Figs 19-20, 36, 47)

Gypsonoma majorana Caradja, 1916, Dt. ent. Z. Iris, **30**: 61-62. Type locality: Russia.*Eucosma leucantha* Meyrick, 1931, Exot. Microlepid., **4**: 145; Clarke, 1958: 368, pl. 183, fig. 3.*Epinotia leucantha* Issiki, 1957: 59, fig. 269.*Epinotia majorana*: Kawabe, 1982: **1**: 123, **2**: 174, pl. 26, fig. 30.

Adult (Figs 19-20). Wing expanse, ♂ 15 mm, ♀ 15~17 mm. No sexual difference in wing maculation. Head whitish ochereous; vertex suffused with fuscous. Antenna blackish gray. Labial palpus whitish ochereous or pale grayish ocher, outside of basal and median segments overlaid with dark brownish gray. Thorax fuscous, mixed with whitish scales; tegula reddish orange terminally. Abdomen brownish gray, with ochereous gray anal tufts. Forewing broad; costal fold reaching to 1/3 of costa; ground color creamy white, mixed with silver gray and fuscous; markings fuscous, mixed with orangeish brown; costa with seven pairs of white ochereous streaks from apex to 1/3 of base; basal patch distinct, outer edge slightly angulated at middle; central fascia distinct, narrowly interrupted at dorsal 1/3; terminal patch slender, confluent with central fascia at costal margin; apical spot small; ocelloid patch distinct, with silvery metallic streak laterally, and marked with two or three black dots medially; cilia creamy white, scattered with dark gray, and with a blackish subbasal line. Hindwing dark brownish gray; cilia ochereous gray, with a dark brownish gray subbasal line.

Male genitalia (Fig. 36). Closely related to those of *P. thapsiana*, but are distinguished from them by the following points: aedeagus shorter than diameter of aedeagus; uncus rather narrower; socius rather shorter than those of *thapsiana*.

Female genitalia (Fig. 47). Sterigma subquadrate. Ostium bursae cup-shaped. Ductus bursae rather long, with a neck before antrum; ductus seminalis originating medially. Corpus bursae globular, spinulate on inner surface: signa two, short and stout horn-like.

Material examined. [CB]- 1 ♂, Mt. Weolak 23, VI. 1085 (Y.I. Lee), ASTI; 1 ♂, 1 ♀, Danyang, 13-18. VII. 1991 (S.Y. Lee), ASTI-gen. sl. no. UIB 181, UIB 182. **JAPAN**- 1 ♀, Kawakami, Gifu Prefecture, 27-30. VII. 1993 (Y.S. Bae), UIB; 1 ♀, Kanaiharu, Shiga Prefecture, 22-24. VIII. 1993 (Y.S. Bae), UIB.

Distribution. Korea (CB), Japan, and Russia.

Host plants. Korea: unknown. Japan: *Heracleum moellendorffii* Hance and *Daucus carota* var. *sativa* DC. (Umbelliferae), (Issiki, 1957).

Remarks. This species and the preceding species, *E. thapsiana*, are closely allied to each other, but can be distinguished by the genital character, as described above. This species is recorded for the first time from Korea.

***Epinotia ulmicola* Kuznetsov, 1966** 느릅애기잎말이나방 (신칭)

(Figs 21, 37)

Epinotia ulmicola Kuznetsov, 1966, Trudy Zool. Inst. Leningr., **37**: 179, figs 3, 4. Type locality: Russia (Far East); Kawabe, 1982, **1**: 123, **2**: 174, pl. 26, fig. 29, pl. 286, fig. 1, pl. 292, fig. 14.

Adult (Fig. 21). Wing expanse, ♂ 13~14 mm. Head pale ochereous; vertex mixed with gray. Antenna brownish gray. Labial palpus pale ochereous; outside of basal segment suffused with gray. Thorax ochereous, mixed with grayish scales; base of tegula scattered with fuscous. Forewing narrow, without costal fold; ground color pale ochereous; markings yellowish brown, mixed with dark brown; costa with

eight pairs of whitish streaks from apex to base; basal patch distinct, outer edge angulated at middle; central fascia ill-distinct, oblique; terminal patch slender, oblique; apical spot moderate, distinct; ocelloid patch creamy white, with pale gray, streak laterally, and containing two or three black dashes medially; cilia pale gray, with a fuscous subbasal line interrupted subapically. Hindwing pale gray, darker apically; cilia concolorous, with a dark subbasal line.

Male genitalia (Fig. 37). Uncus long and narrow, with pointed apex, bearing long hairs. Socius moderate, broad, with densely long hairs. Valva rather narrow, with narrow neck, deeply concave near 2/3 of ventral margin, and with well-defined angle at lower margin; cucullus bearing stout spines along ventral margin from base to 4/5; sacculus sclerotized, with a stout spines cluster below neck. Aedeagus short, simple; cornuti a bundle of long scale-like spines.

Material examined. [GG]- 1 ♂, Mt. Yumyeong, 17. VI. 1990 (K.T. Park), CIS-gen. sl. no. 3517; 1 ♂, Anyang, 21. VI. 1984 (I.S. Kim), ASTI.

Distribution. Korea (GG), Japan, and Russia (Primorye and Kuril Is.).

Host plants. Korea: unknown. Japan: *Zelkova serrata* (Thunb.), *Ulmus davidiana* Planchon var. *japonica* (Read.), and *U. laciniata* (Trautv.) Mayr. (Ulmaceae), (Kawabe, 1982).

Remarks. This species is similar to *E. rubricana* in the superficial appearance, but can be separated from the latter by the defined basal patch of the forewing. The species is recorded for the first time from Korea.

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韓國產 *Epinotia* Hübner屬 (나비목, 잎말이나방科)의 分類學的 研究

裴 良 燮

仁川大學校 自然科學大學 生物學科

韓國產 *Epinotia*屬을 재검토한 결과 총 16種의 分布가 확인되었으며, 그 중 1新種 *E. parki* sp. nov.를 記載하고, *E. cruciana* (Linnaeus), *E. pinicola* Kuznetsov, *E. thapsiana* Zeller, *E. majorana* (Caradja)와 *E. ulmicola* Kuznetsov 등 5種을 韓國 未記錄種으로 보고한다. 종래 보고되었던 10종을 포함, 16種의 成蟲, 生殖器의 그림 및 기주식물의 기록과 함께 기재 혹은 재기재 하였다. 성충과 수컷생식기에 의한 檢索表를 작성하였다.

검색어 : 분류, 나비목, 잎말이나방과, 애기잎말이나방아과, *Epinotia*속, 신종, 한국

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